

the area covered. The usefulness of the book declines as one travels away from the coverage area. Elsewhere in the eastern U.S. other books such as the recent Peterson Field Guide should be referenced.—*Dr. Paul A. Opler, National Biological Survey, 1201 Oak Ridge Drive, Suite 200, Fort Collins, Colorado 80525.*

J. New York Entomol. Soc. 102(3):401–403, 1994

A Functional Biology of Parasitism: Ecological and Evolutionary Implications.—G. W. Esch and J. C. Fernandez. Chapman and Hall, Cambridge, 1993. ISBN 0 412 39910 5; 337 pp., 81 figs.

There has been a steadily growing interest in the role of parasites in ecological and evolutionary studies during the latter half of this century. This interest has been encouraged by the search for rigorous approaches to the issues of historical associations (coevolution) of hosts and parasites and the related historical ecology, microevolutionary arms race scenarios between hosts and parasites, the relationships between parasites and sexual selection of their hosts, the Red-Queen hypothesis, and the ecological constraints surrounding parasite and host community structures. Parasites have become so compelling as research subjects, in fact, that “A Functional Biology of Parasitism” by Esch and Fernandez will be found on book store shelves alongside, and in competition with, other recent works such as “Phylogeny, Ecology and Behaviour” and the just released “Parascript” both by Brooks and McLennan as well as “Natural Enemies” by Crawley and “Bird-Parasite Interactions” by Loye and Zuk. The strengths of “A Functional Biology of Parasitism” are primarily in the field of host-parasite community structure and dynamics. Those interested in phylogenetic or biogeographical aspects of parasite biology should, however, look elsewhere as these are dealt with in only a cursory way by Esch and Fernandez.

The Introduction may well dissuade many from going on and reading the rest of the book as it jumps straight into helminthology, moving from one specific example to the next rather than priming the reader with a few generalizations about parasite biology. This is unfortunate as it does a disservice to the contents that follow. Little is given up by moving quickly to the second chapter, Population Concepts, and perhaps reading the last chapter, the Summary, before deciding whether to proceed. The most valuable contribution made by the authors is that chapters 3 through 7 serve as an unrivaled compilation of case studies of helminth parasite population biology and a valid attempt to summarize elements of modern ecological theory within a parasitological framework. Moreover, the perspectives of infra-, meta-, and suprapopulations are maintained throughout, not only in the text but in the graphical representations of life cycles. Some factors that play fundamental roles in the life-histories and transmission dynamics of helminths are addressed (Chapter 3), as are factors involved in host population structure (Chapter 4). With respect to the latter, the authors provide a useful digression into the origins of modern methodology with Crofton’s early approaches to parasite regulation of host populations leading into the more realistic approaches of May and well-designed investigations by Scott. Unfortunately, the naive reader might be left with the expectation that parasites are known

to regulate host populations as opposed to being made aware that this remains a hotly debated notion. The section on modeling, though brief, is among the more enlightening and should serve as an inducement to parasitologists to construct testable hypotheses and appropriate experimental designs. Chapter 5 (Life History Strategies) makes for very interesting reading, providing a flavour for the variety of modes of transmission among parasitic helminths and how this relates to multiple stages in life-histories, host-seeking behaviours, morphology, reproductive strategies and selection regimes. Chapters 6 and 7 (Infracommunity Dynamics, and Component & Compound Communities, respectively) are related and should be read as though they were a single chapter dealing with the ebb and flow of parasites among the members of host populations at various levels of the life cycle. The study of the dynamics of parasite flow through ecosystems and food webs, near the end of Chapter 7, highlights an exciting research programme that is still largely untapped. In these chapters as in the next (Biogeographical Considerations) the authors seek to explain the distribution of parasites among hosts primarily in terms of colonization and local extinction, relegating the role of historical macroevolutionary constraints to an ancillary position. Similarly, in Chapter 8 (Evolutionary Aspects) they provide a concise overview of recent microevolutionary lines of investigation such as genetic variability, gene tracking between hosts and parasites, the Red-Queen hypothesis and sexual selection studies. The authors treat issues of phylogenetic relationships, however, only briefly and conclude that phylogenetic systematics is unreliable, citing as evidence a fantastical mechanism in which retroviruses transfer genetic material between hosts and parasites.

The authors endeavor to define carefully all components of parasite ecology, some repeatedly as is necessary, allowing ease of understanding for the ecological novice. The book suffers, however, from an emphasis on helminthological parasites, alimentary ones in particular. This leads the authors to accept such conclusions as amphibians and reptiles are "the least diverse and most depauperate of the vertebrate groups" with respect to parasites that inhabit them. This may be true for intestinal helminths, but when metazoan parasites of viscera and muscle of frogs are considered the perspective changes markedly. Moreover, when one adds protozoan parasites of the blood and intestines of anurans, the parasitic fauna becomes enormous. The reliance on intestinal helminthology stems more from the available ecological studies than from the authors' bias. In fact, they repeatedly conclude the subsections of each chapter with cautions, emphasizing how difficult it is to draw conclusions on the basis of such limited data. In addition to the authors' urgent calls for more long-term studies, a shift toward appropriate experimental design should be added.

This book will be of greatest value at the student level and to traditional parasitologists (helminthologist and protozoologist alike) who have had limited exposure to, or interest in, studying the population biology and ecological interactions that pervade the lives of their parasites of interest. In reading "A Functional Biology of Parasitism," one quickly sees the lines of investigation that have been followed fruitfully as well as the pitfalls that await. By far the work most cited is that of Esch and his collaborators (including Aho, Bush, Holmes and Kennedy). Non-traditional parasitologists such as entomologists will undoubtedly be disappointed in the absence of examples or reference to the extensive ecological literature on gall-forming midges or wasps, inquilines and parasitic wasps and flies. Some attention is given to the

important role played by arthropods as intermediate hosts of helminths and a quick look at the Taxonomic Host Index will point to these. Those who are interested generally in ecology and population biology will find interesting examples of applications from among the community of helminthologists and the distinctiveness of some of the questions, but may find some of the data analysis less than compelling or entirely up to date. A chapter on experimental design and statistical evaluation of ecological data is noticeably lacking from this book and would have added significantly to its value. As it is, "A Functional Biology of Parasitism" is best seen as a reasonably thorough compendium rather than a how-to book on parasite population biology.—*Mark E. Siddall, Virginia Institute of Marine Science, Gloucester Point, Virginia 23062.*